MEMORANDUM FOR LABORATORY FILES

Re: Screening Lodgepole Pine to Prevent Attacks of the Mountain Pine Beetle, 1933-38.

by
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Coeur d'Alene, Idaho
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When the mountain pine beetle attacks a lodgepole pine in sufficient numbers, the resistance of the tree is rapidly overcome. Therefore, knowing that the death of the tree cannot be prevented, control work is concentrated on destroying the insects in the tree to prevent their emergence and invasion of other trees. While such control will reduce the outbreak and protect the forest as a whole, it will not prevent attacks of individual trees of high aesthetic value around campgrounds and summer homes. Observation of the habits of attack of the mountain pine beetle revealed that they first invaded the lower bole of a lodgepole pine. It was thought repelling invasion of that portion of the tree might prevent any attack, and on that basis a series of sprays and coatings was applied. None of these were effective, but a mechanical barrier in the form of screen gave promise of success. The screen was applied as a loose-fitting sleeve around the lower bole, fastened at the top and bottom by loops of wire which held the screen against the bark. The seam of the sleeve was made tight by inserting the overlapped edges of the screen between two laths and

then fastening the two laths together by means of shingle nails. The unscreened root collar of the tree was covered with dirt until it overlapped the lower edge of the screen.

In 1933 nine green lodgepole pine were screened as follows: to 10 feet, 3 trees; to 15 feet, 3 trees; to 20 feet, 3 trees. One of these trees was later killed by nine mountain pine beetle attacks and a "fill-in" of secondary insects, which had gained entrance because the contraction of the screen and swaying of the tree had pulled it loose and exposed the base of the tree.

The apparent immunity to attack of the remaining trees warranted enlarging the experiment and in 1934 twenty-five of the larger valuable lodgepole pine remaining around the Elkhorn Hot Springs resort on the Beaverhead Forest were screened. Hoping to assure even greater protection than was afforded the trees screened in 1933, only one of them was screened to less than 20 feet, one to 30 feet, and the average to 22.3 feet. The height to which trees were screened was increased with the larger-diameter lodgepole pine, previous studies having shown such trees were initially attacked at a greater height and subsequent "fill-in" extended higher than on smaller trees.

In the two years following screening of these 25 trees two were observed to have a few attacks by the mountain pine beetle and secondary insects, both above the screen and where rain had washed the dirt from the base of the tree, but they were too few to overcome the trees. In 1936 no attacks were noted on the screened trees in spite of unfavorable

environmental conditions brought about by the death and removal of the large amount of insect-killed timber adjoining most of the screened trees. The latter are now the larger and often isolated survivors of a formerly moderately dense stand. Water table, temperature, light, wind and surface moisture changes have undoubtedly occurred, creating conditions generally unfavorable to the survival of such mature trees.

In 1937, one tree, evidently weakened by road-fill piled against it, succumbed to the attack of small secondary bark beetles which had apparently either forced their way between the wires of the 14-mesh screen or had taken advantage of the loosening of the screen adjoining a cat-faced area on the tree. A surprising feature was the finding of larvae of the larger wood borers under bark over which the screen had been tightly drawn. Because of lack of room for movement of any but the smallest bark beetles between the bark and the screen it seems necessary to conclude that the parent beetles laid their eggs <u>through the screen.</u>

In 1938 the loss of another tree, in this case from windthrow, was recorded. Loss of the surrounding stand has so exposed the remaining trees to windthrow, that considerable loss may be expected from that source in the coming years. Growth of many of the trees since screening had caused sufficient tightening of the loop of wire holding the top of the screen to threaten girdling of the tree. To prevent this, a long screen-door spring of the coil type was substituted for

part of the wire. By their use it is believed sufficient tension is provided to hold the screen in place and at the same time enough flexibility is present to allow for growth of the tree. It has also been found that shingle nails do not have sufficient holding power in the lath. Swaying of the trees and alternate wetting and drying and consequent warping tend to work the nails out of the lath. The use of rough galvanized or cement-coated nails is suggested in future work.

With the decided decline in the outbreak in 1933, and no heavy build-up of the infestation subsequently, no further adequate test of the method was possible on the Beaverhead Forest, so 27 more trees were screened to a fairly uniform height of about 20 feet in 1935 near Antelope Flat on the Targhee Forest, where an active infestation was developing.

Examination late in 1935 showed only two attacks had occurred on the trees screened that year, one on the inside of the screen of one tree, probably enclosed at the time of screening, and the second above the screen on a second tree. This immunity persisted in spite of the fact that the north part of the screened group was in the midst of 29 trees attacked subsequent to the screening in 1935.

In 1936 one tree was heavily attacked near the screened trees and "fill-ins" had occurred on three trees unsuccessfully attacked in 1935, two of very light and one of medium intensity. Ample timber of

the size susceptible to bark beetle attack remains within and adjoining the group of screened trees.

In 1937 one screened tree was attacked for two feet above the screen, but the 25 attacks in that area were insufficient to overcome the tree's resistance and the beetles were "pitched-out". Within 50 feet of this tree were 5 others which had been heavily attacked, but none of the others nearby which had been screened were invaded.

In 1938 not only were none of the screened trees attacked, but no attacked trees were found within 5 chains of the group. All but one of the screened trees were apparently in good growing condition. The exception showed more fading needles than seemed normal and its foliage is thinner than on neighboring trees.

Activity of the mountain pine beetle is now at a very low ebb on the Antelope Flat area but the fact that in two previous years trees were killed within or near the group of screened trees seems to indicate the protection is sufficient to prevent death of the trees, although the attack of one above the screen seems to indicate the protection is insufficient to prevent attacks. The experience on the three areas on which experiments were conducted was the same; death of the trees from beetle attack may be prevented but it is felt that the method has not been subjected to as severe a test as is considered necessary to warrant a definite statement concerning its effectiveness.

To give the method still further tests ~~22~~ 26 trees adjoining the headquarters of the Grand Teton Park were screened in 1938. These trees may prove to be a very difficult test of the method because many of them have grown in the open with consequent short bole and large spreading branches extending to within 6 to 8 feet of the ground. Screen could only be carried a short distance above the lowest branches due to attendant difficulties in handling the screen. The large amount of work for the somewhat meager protection afforded was considered justifiable because of the high aesthetic value of these trees and the activity of the mountain pine beetle in the adjoining timber stand. However, with screen extending to as little as 10 feet above ground on some trees, adequate protection, while hoped for, can hardly be expected. None of the screened trees were attacked by the mountain pine beetle in 1938.

If the present outbreak of the mountain pine beetle in the Grand Teton Park persists, it might give the method an excellent test and also serve as an index of the minimum amount of screening necessary to afford protection.

A surprising feature is the comparative inconspicuousness of the galvanized screening on the trees. It is believed the use of the common black screen or of grey or brown stain on the galvanized screen and the lath would make them even less conspicuous than at present.

SUMMARY

During the period from 1933 until 1938, 83 lodgepole pines have been screened to protect them from attacks of the mountain pine beetle. Lacking definite evidence of their susceptibility, we do not know how many trees would have been attacked by the mountain pine beetle had they not been screened. However, the many trees in and around those screened which were attacked, indicate that some measure of protection was afforded. This conclusion is strengthened by the fact that one tree heavily attacked above the screen was still able to "pitch out" the invading insects. Several other trees had one or more attacks by the mountain pine beetle but too few to be significant. Two trees were killed by the attack of secondary insects after the screen had become loosened. One of these two trees had been weakened by road fill and injury from road construction. A third was windthrown. This leaves 79 of the original 83 trees still effectively protected by the screen and one which had "pitched out" a moderately heavy attack.